

# PROBABILITY

(P1 + P2) (5-6 Marks)

→ This is only chapter in syllabus which require you to read and UNDERSTAND scenario.

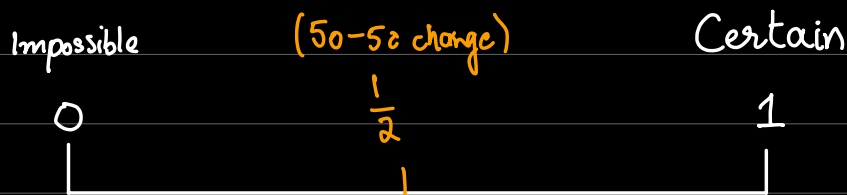
## STUDY OF CHANCE

RAIN : 30 %

NOT RAIN = 70 %

$$P(\text{RAIN}) = \frac{30}{100} = \frac{3}{10}$$

$$P(\text{NOT RAIN}) = \frac{70}{100} = \frac{7}{10}$$



$$P(\text{event}) = \frac{\text{FAVORABLE OUTCOMES}}{\text{TOTAL OUTCOMES}}$$

1) Toss A FAIR COIN : H/T

Total = 2

$$P(\text{Head}) = \frac{1}{2}$$

$$P(\text{Tail}) = \frac{1}{2}$$

2

2) Toss Two Coins:

TOTAL = 4

HH TT HT TH

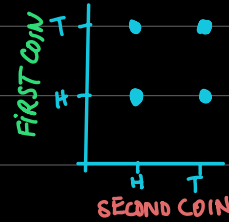
$$P(\text{both tails}) = \frac{1}{4}$$

HT or TH

$$P(\text{a head and a tail}) = \frac{2}{4} = \frac{1}{2}$$

HH or TT

$$P(\text{both same}) = \frac{2}{4} = \frac{1}{2}$$



3) ROLL A DICE/DIE: 1/2/3/4/5/6 Total = 6

2, 4, 6

$$P(\text{even}) = \frac{3}{6} = \frac{1}{2}$$

2, 3, 5

$$P(\text{prime}) = \frac{3}{6} = \frac{1}{2}$$



FACTORS

V/S

MULTIPLE

1, 2, 3, 4, 6 (12) 24, 36, 48, 60, ...

12 IS BOTH FACTOR  
AND MULTIPLE OF  
ITSELF.

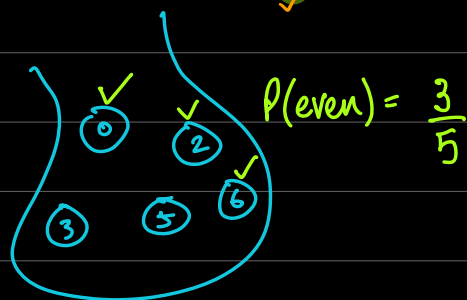
NO DECIMALS  
NO FRACTIONS

NATURAL: 1, 2, 3, 4, ...

WHOLE: 0, 1, 2, 3, 4, ...

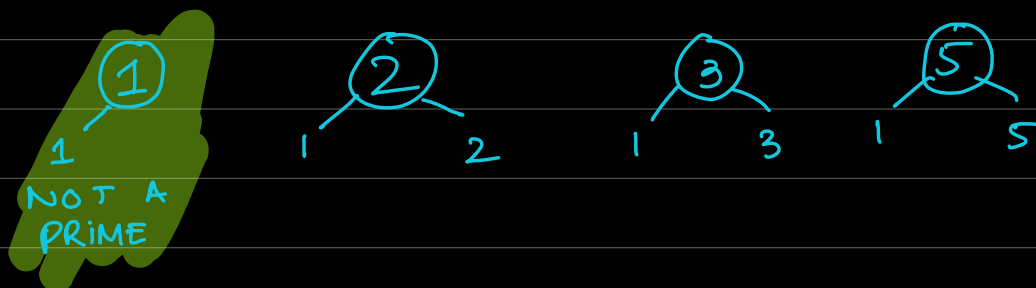
INTEGERS: Numbers without decimal & fraction.  
... -3, -2, -1, 0, 1, 2, 3, ...

EVEN: Leaves no remainder when divided by 2  
0, 2, 4, 6, 8, ...

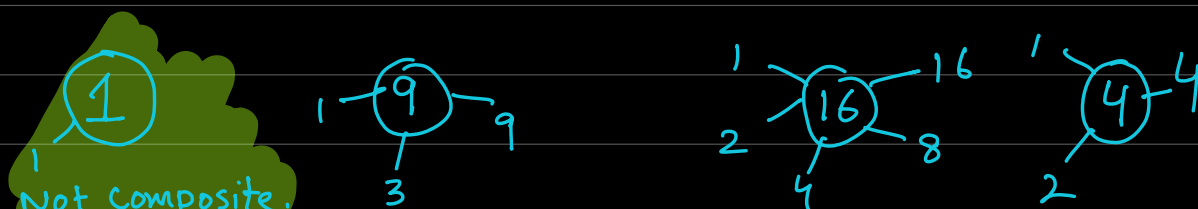


ODD: 1, 3, 5, 7, ...

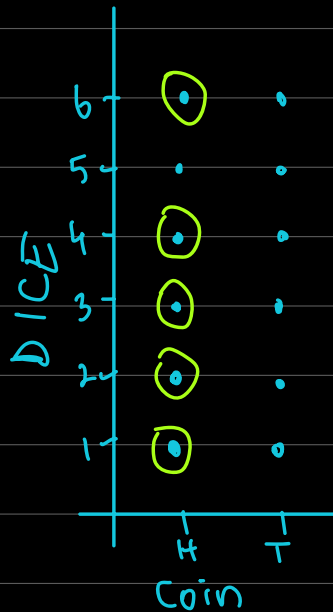
PRIME: EXACTLY TWO FACTORS



COMPOSITE: MORE THAN 2 FACTORS



4) ROLL A DICE AND TOSS A COIN: TOTAL=12



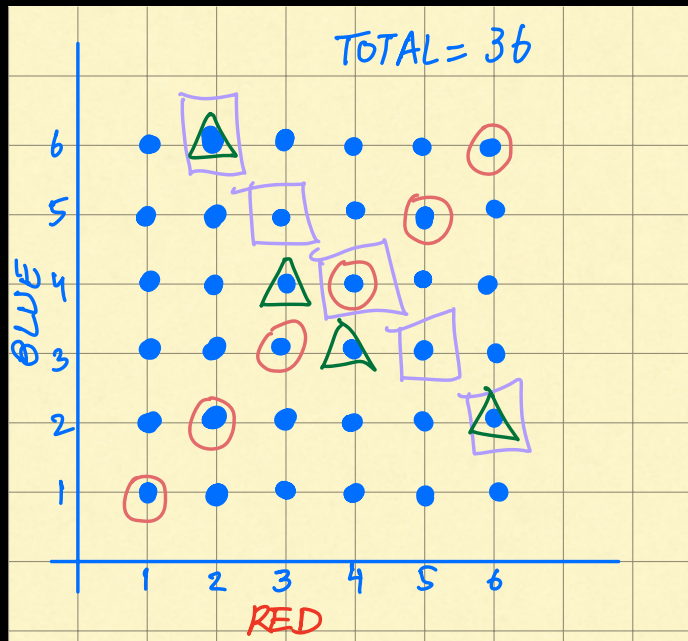
Total=12

(#4) ??

$$P(\text{tail with even}) = \frac{3}{12} = \frac{1}{4}$$

$$P(\text{head with } \overbrace{1, 2, 3, 4, 6, 12}^{\text{factor of 12}}) = \frac{5}{12}$$

#### 4) ROLL TWO DICES:



$$P(\text{both Same}) = \frac{6}{36} = \frac{1}{6}$$

$$P(\text{Sum is 8}) = \frac{5}{36}$$

$$P(\text{Product is 12}) = \frac{6}{36} = \frac{1}{6}$$

|    |    |    |    |    |    |
|----|----|----|----|----|----|
| 11 | 21 | 31 | 41 | 51 | 61 |
| 12 | 22 | 32 | 42 | 52 | 62 |
| 13 | 23 | 33 | 43 | 53 | 63 |
| 14 | 24 | 34 | 44 | 54 | 64 |
| 15 | 25 | 35 | 45 | 55 | 65 |
| 16 | 26 | 36 | 46 | 56 | 66 |

#### TREE DIAGRAMS:

##### RULES:

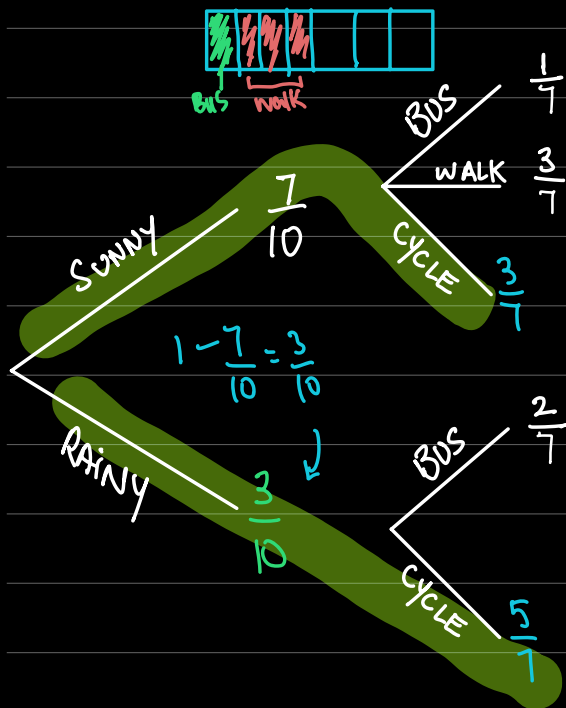
- 1) SUM OF ALL PROBABILITIES OF BRANCHES STARTING FROM SAME POINT IS ALWAYS 1.
- 2) BRANCH TOTAL PROBABILITY = MULTIPLY
- 3) MORE THAN ONE = ADD INDIVIDUAL BRANCH BRANCH TOTALS

OPERATORS

AND mean MULTIPLY

OR means ADD

ONLY ON TREE DIAGRAMS, WE WRITE FRACTIONS WITHOUT SIMPLIFICATION



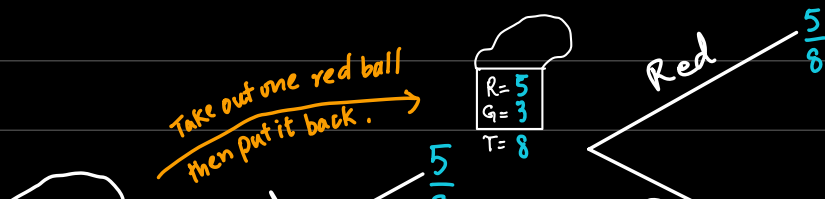
$$P(\text{sunny and bus}) = \frac{7}{10} \times \frac{1}{7} = \frac{1}{10}$$

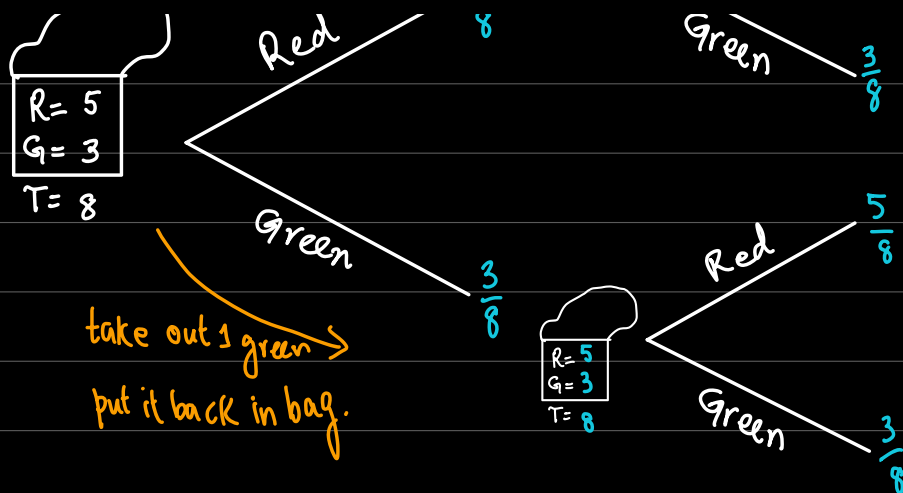
$$\begin{aligned} P(\text{cycle}) &= \left( \frac{1}{10} \times \frac{3}{7} \right) + \left( \frac{3}{10} \times \frac{5}{7} \right) \\ &= \frac{21}{70} + \frac{15}{70} \\ &= \frac{36}{70} = \frac{18}{35} \end{aligned}$$

Revise till here. we will continue tomorrow.

TWO DRAWS WITH REPLACEMENT

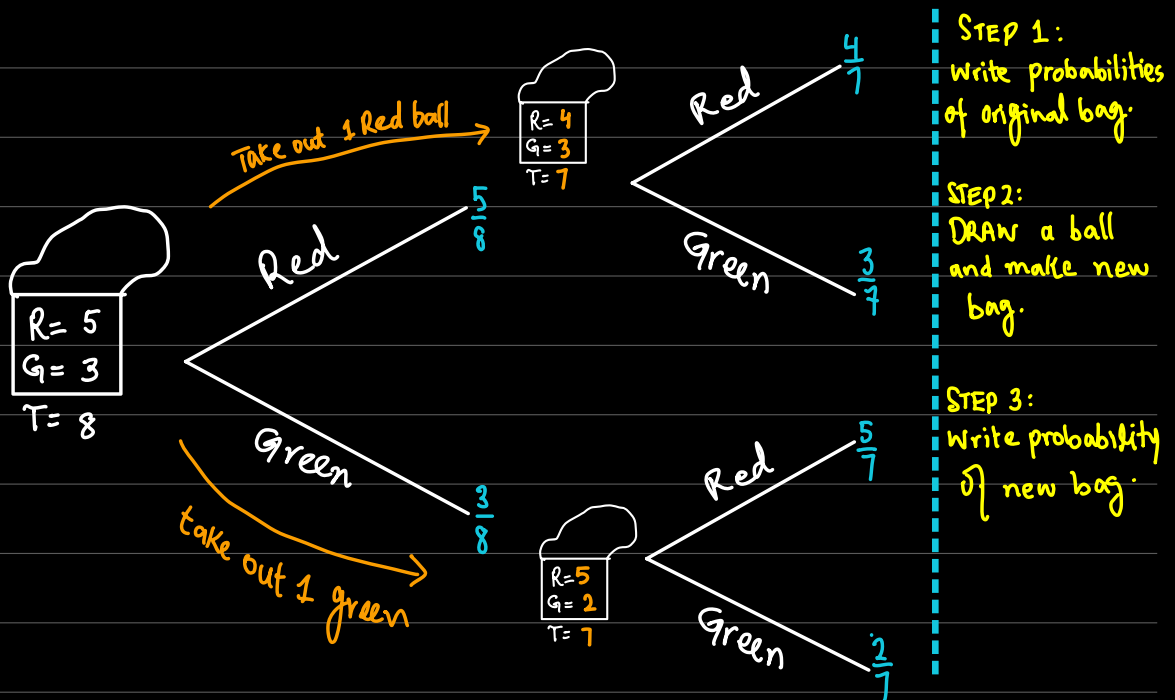
TAKE OUT ONE BALL, CHECK ITS COLOUR, PUT IT BACK IN BAG, TAKE ANOTHER BALL



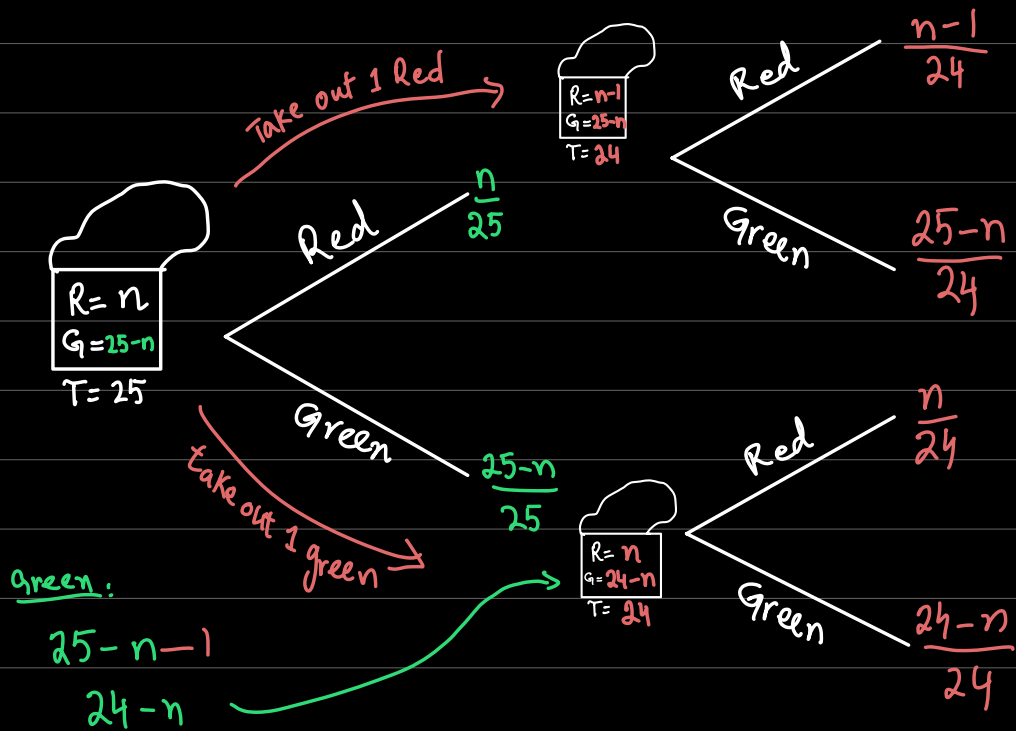


## TWO DRAWS WITHOUT REPLACEMENT

TAKE OUT ONE BALL, NOTE ITS COLOUR, THROW IT AWAY. NOW TAKE ANOTHER BALL OUT.

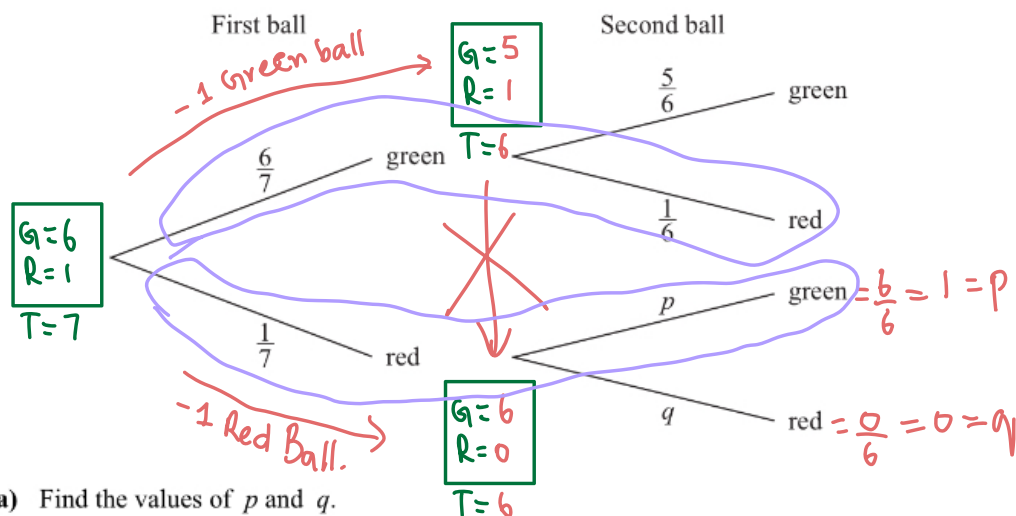


## TWO DRAWS WITHOUT REPLACEMENT





- 7 A bag contains 7 balls, 6 of which are green and 1 is red.  
Two balls are taken from the bag, at random, without replacement.  
The tree diagram that represents these events is drawn below.



- (a) Find the values of  $p$  and  $q$ .

Answer (a)  $p = \underline{1}$   $q = \underline{0}$  [1]

- (b) Expressing each answer as a fraction in its simplest form, find the probability that

- (i) both balls are green,

$$\frac{6}{7} \times \frac{5}{6} = \frac{5}{7}$$

Answer (b)(i) ..... [1]

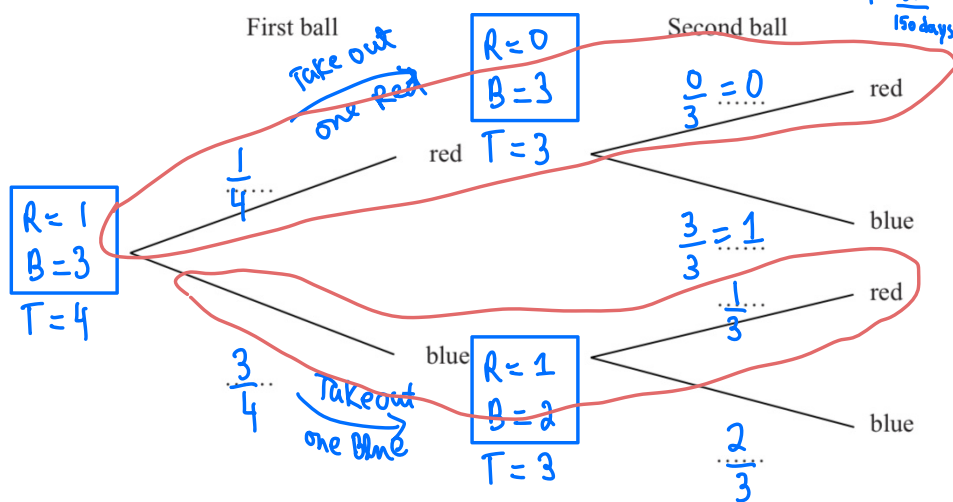
- (ii) the two balls have different colours.

$$\left( \frac{6}{7} \times \frac{1}{6} \right) + \left( \frac{1}{7} \times 1 \right)$$

$$\frac{1}{7} + \frac{1}{7} = \frac{2}{7}$$

Answer (b)(ii) ..... [1]

- 11** A bag contains 1 red and 3 blue balls.  
Two balls are taken from the bag, at random, without replacement.  
The tree diagram that represents all the outcomes is shown below.



- (a) Write the appropriate probability on each branch.

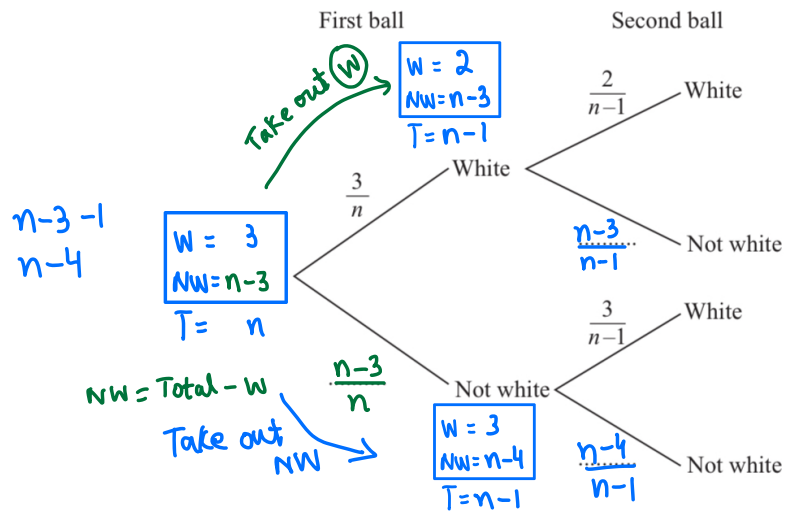
[2]

- (b)** Find the probability that the second ball taken is red.

$$\left(\frac{1}{4} \times 0\right) + \left(\frac{3}{4} \times \frac{1}{3}\right) = \frac{1}{4}$$

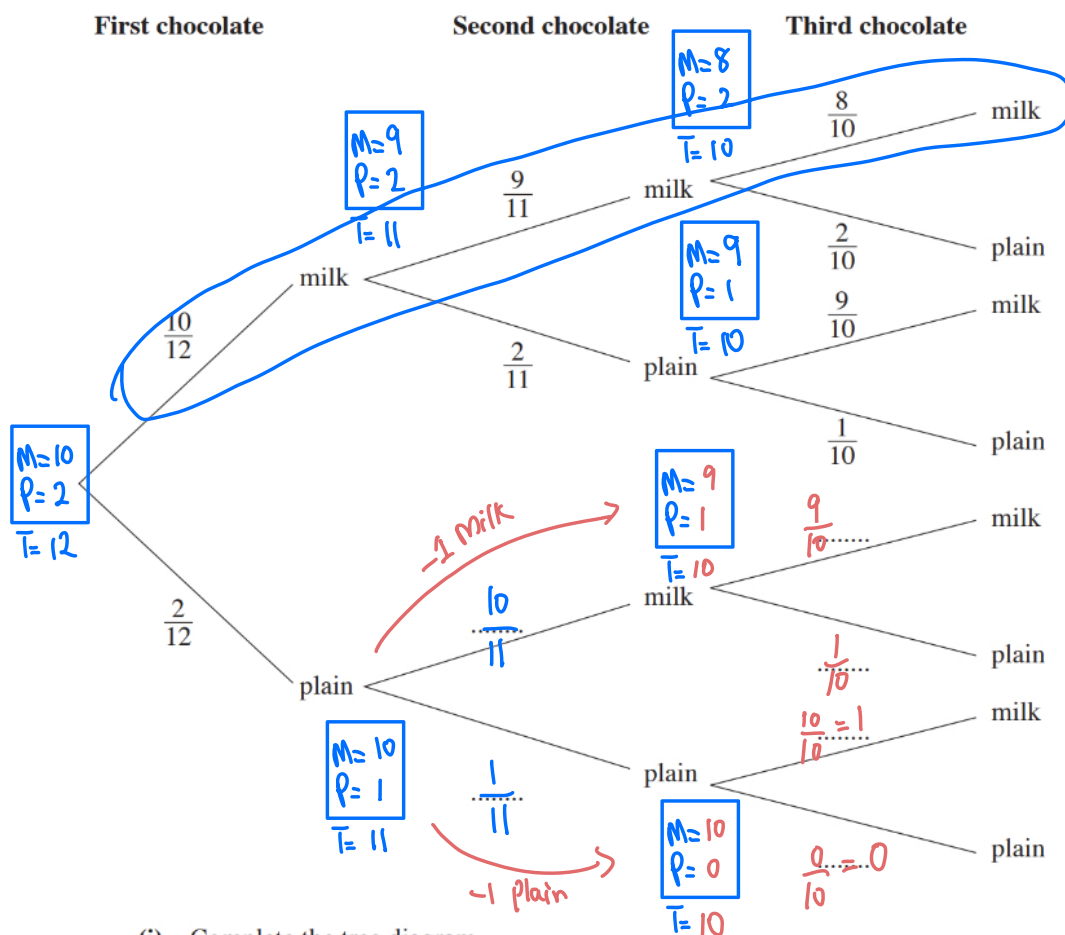
*Answer* ..... [1]

- (a) Complete the tree diagram.



[2]

- 4 (a) A box of chocolates contains 10 milk chocolates and 2 plain chocolates.  
Sacha eats 3 chocolates chosen at random from the box.  
 The tree diagram shows the possible outcomes and their probabilities.



(i) Complete the tree diagram. [2]

(ii) Expressing each answer as a fraction in its lowest terms, find the probability that Sacha

(a) eats 3 milk chocolates,

$$P(\text{Three milk}) = \frac{10}{12} \times \frac{9}{11} \times \frac{8}{10} =$$

Answer ..... [1]